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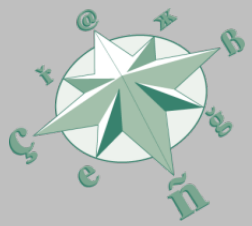
ALeF: Active Learning Framework for Readability Prediction

Philip van Oosten — Véronique Hoste

LT^3, Language and Translation Technology Team

Atila, September 23, 2010



Overview

1. Problem setting
   - In general
   - Our proposed solution for readability prediction
2. The Wolfit workflow engine
   - Wolfit API
   - Wolfit Editor screenshots
3. ALeF: active learning on top of Wolfit
   - Cascaded approach
   - With active learning: ALeF
   - Solutions provided by ALeF

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Overview

Overhead for NLP experiments

Infrastructure

- setting up software infrastructure: in many cases overhead or done manually
- maintenance of complex tasks $\rightarrow$ overhead.

Resources

- corpus annotation often necessary
- data sets often used in isolation $\Longrightarrow$ experimental results often incomparable
- data set used in more tasks or settings $\Longrightarrow$ more valuable to compare methodologies
- more data sets per task $\Longrightarrow$ better comparison of methodologies

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Possible solutions

Infrastructure

- applications of which small parts can be adapted.
- workflow engines
- ...

Resources

- share resources
- use same data in multiple settings
- ...

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Our solution for Readability Prediction

Readability prediction is a small domain

$\Longrightarrow$ try to provide solutions that can be generalized to other domains
(but first focus on readability)

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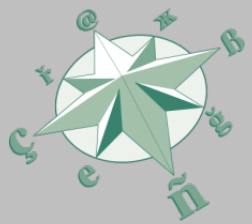
Our solution for Readability Prediction

Readability prediction is a small domain

$\Longrightarrow$ try to provide solutions that can be generalized to other domains
(but first focus on readability)

- a workflow engine built to reduce overhead
- built on top of that: ALeF, a complete framework for readability research

Status: implementation of the workflow engine



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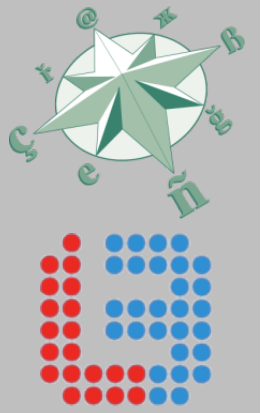
Overview

Advantages of workflow engines?

Separation of concerns, so that users need only minimal knowledge of

- multiple programming languages
- pipelining/parallellization
- in-detail usage of resources



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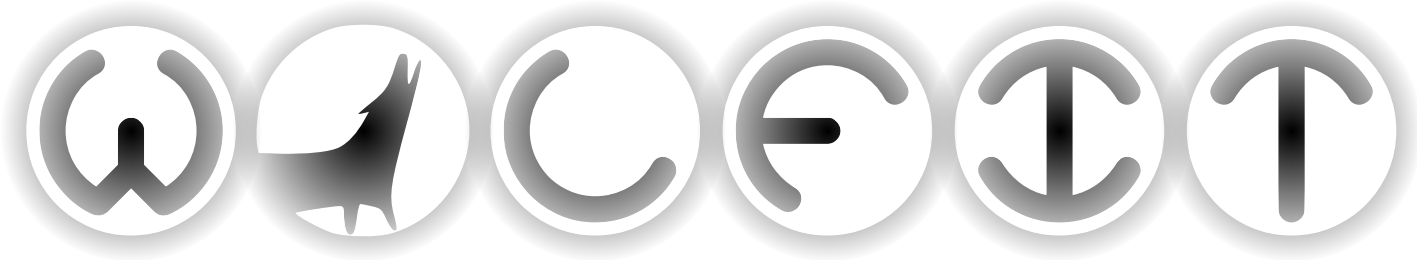

A workflow engine focused on rapid development

- API to construct and execute workflows
- web application to construct workflows (django-wolfit)
- GNU GPLv2 on Google Code

`http://code.google.com/p/wolfit`
`http://code.google.com/p/django-wolfit`

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Wolfit API

Functionality:

- construct/configure/execute workflows
- expose workflows as Python functions
- import and export
- visualization

To do:

- abstract workflows
- more task types: CLI, CObject, Java, ...
- workflows as tasks in other workflows
- more control structures
- ...

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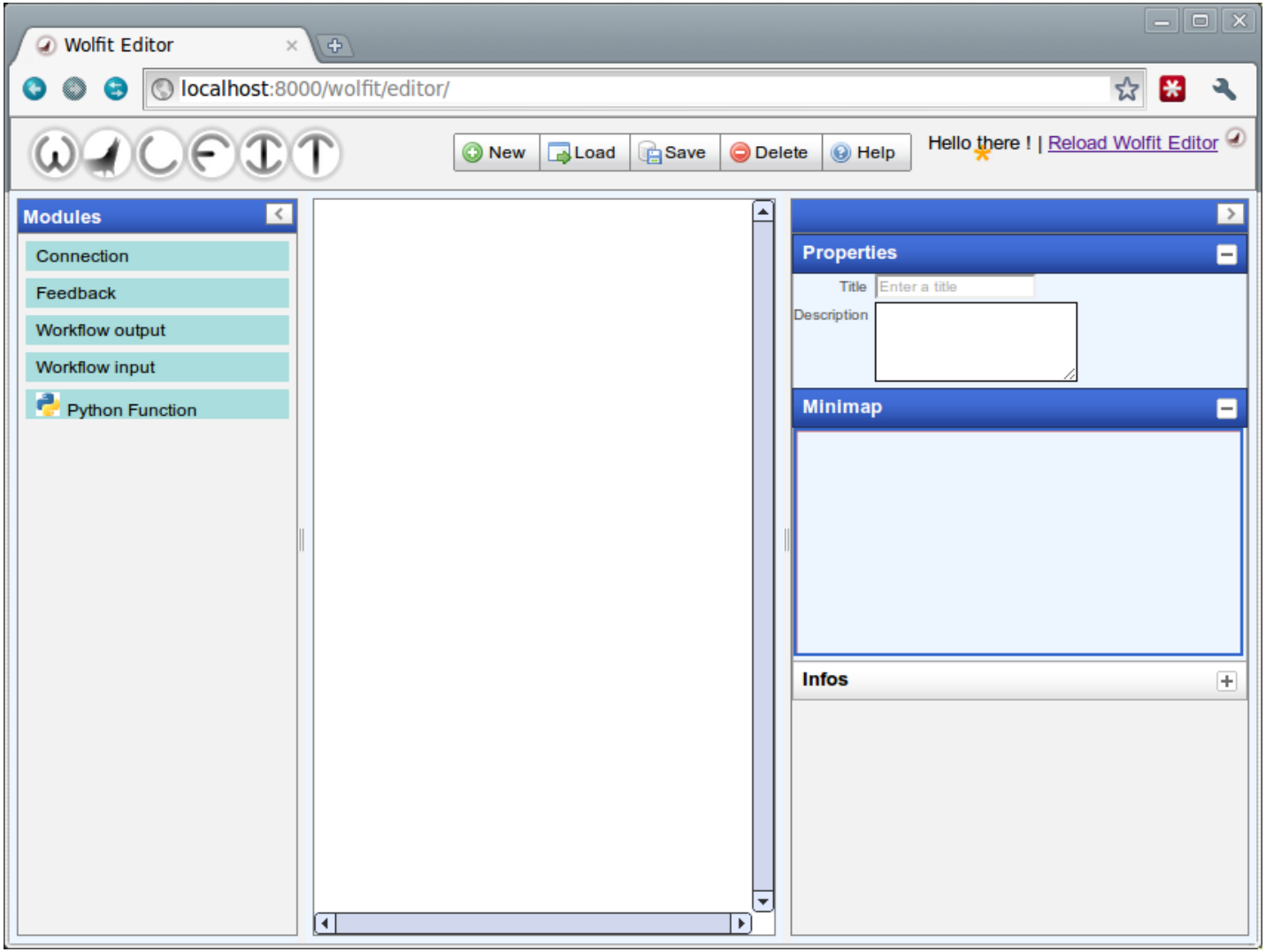
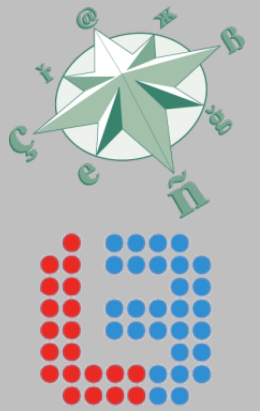
An empty editor. Left: available modules
Right: Name, description, minimap, info
Top: New, load, save, delete, . . . buttons





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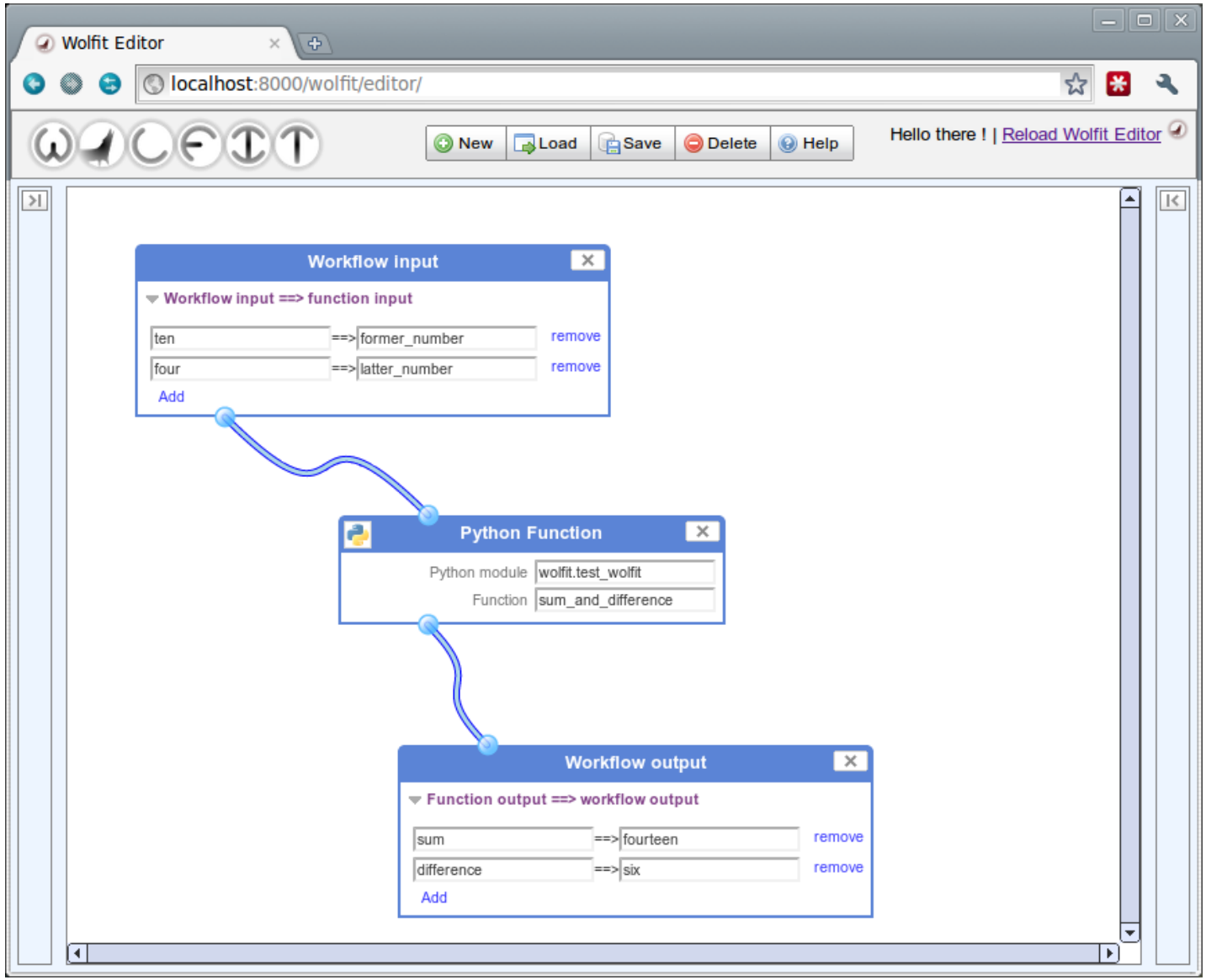
A function connected to workflow input and output.



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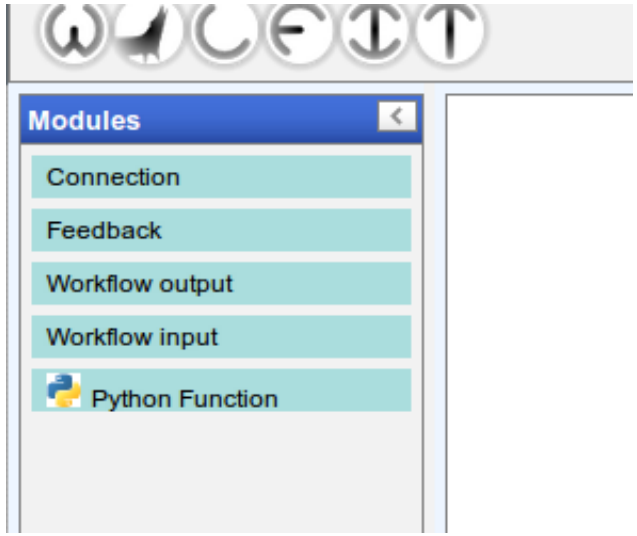
The currently available modules.



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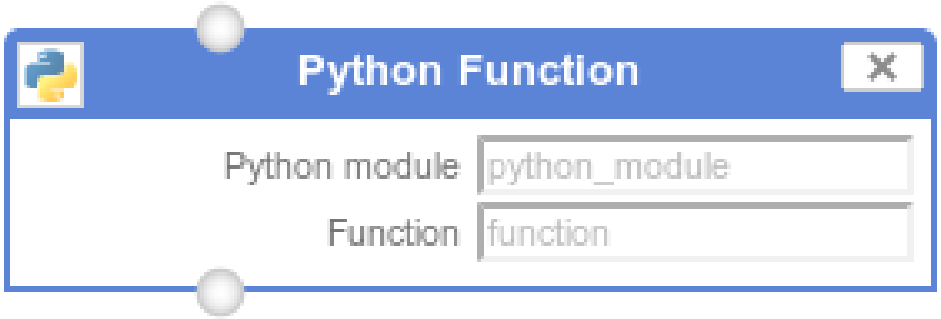
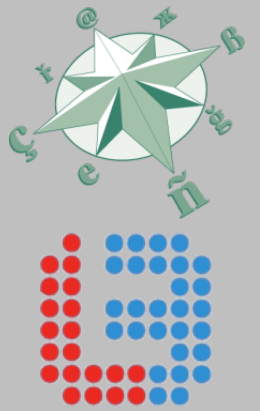
A python function, taking keyword arguments as input and a dictionary as return value.





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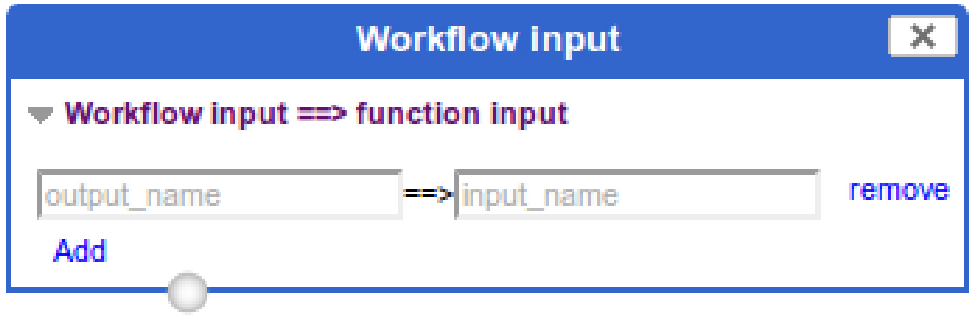
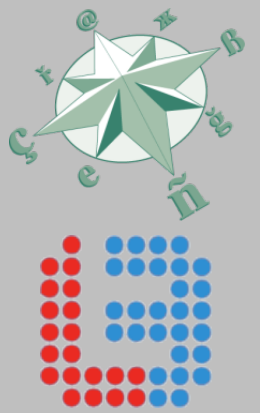
A workflow input





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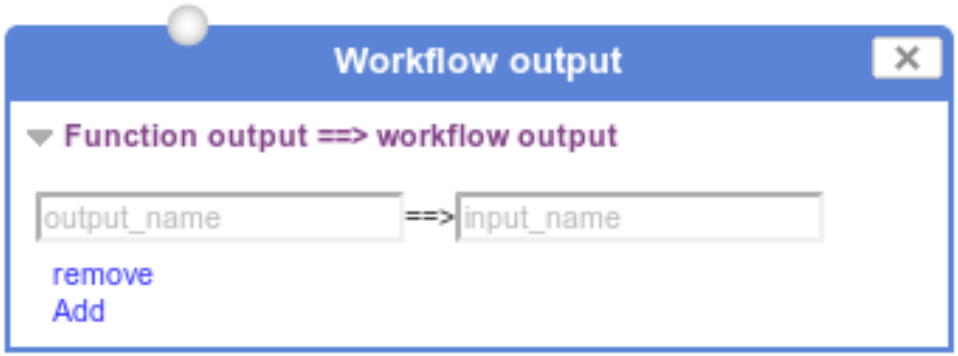
A workflow output



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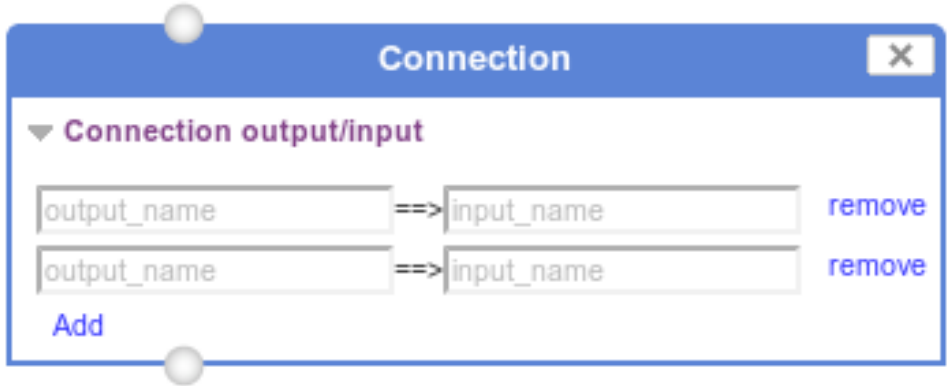
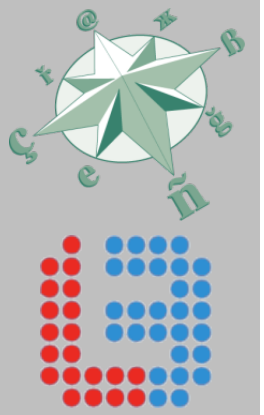
A connection between two functions





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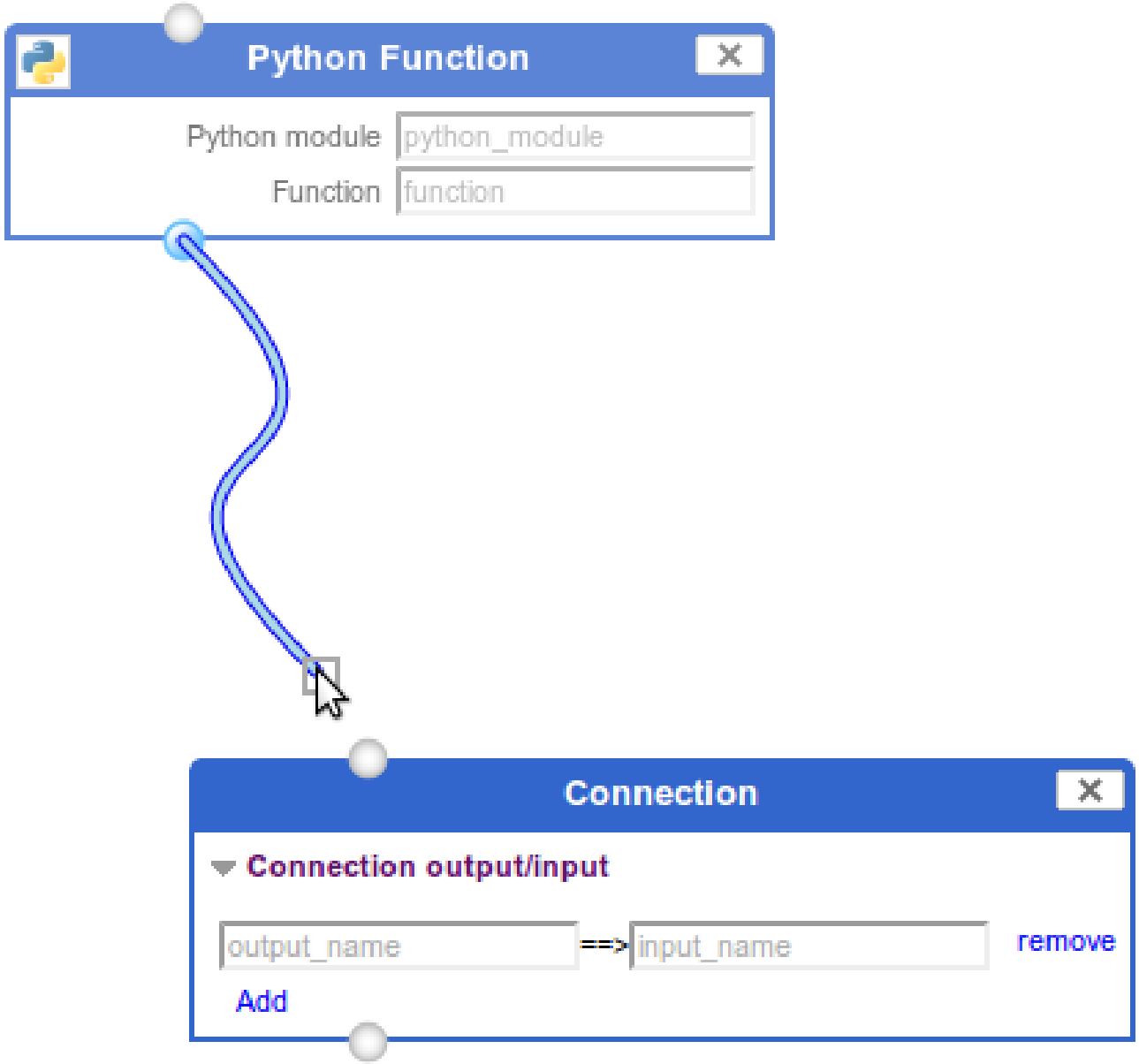
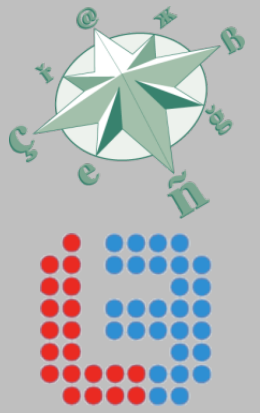
You can connect modules by dragging from one *terminal* to another.





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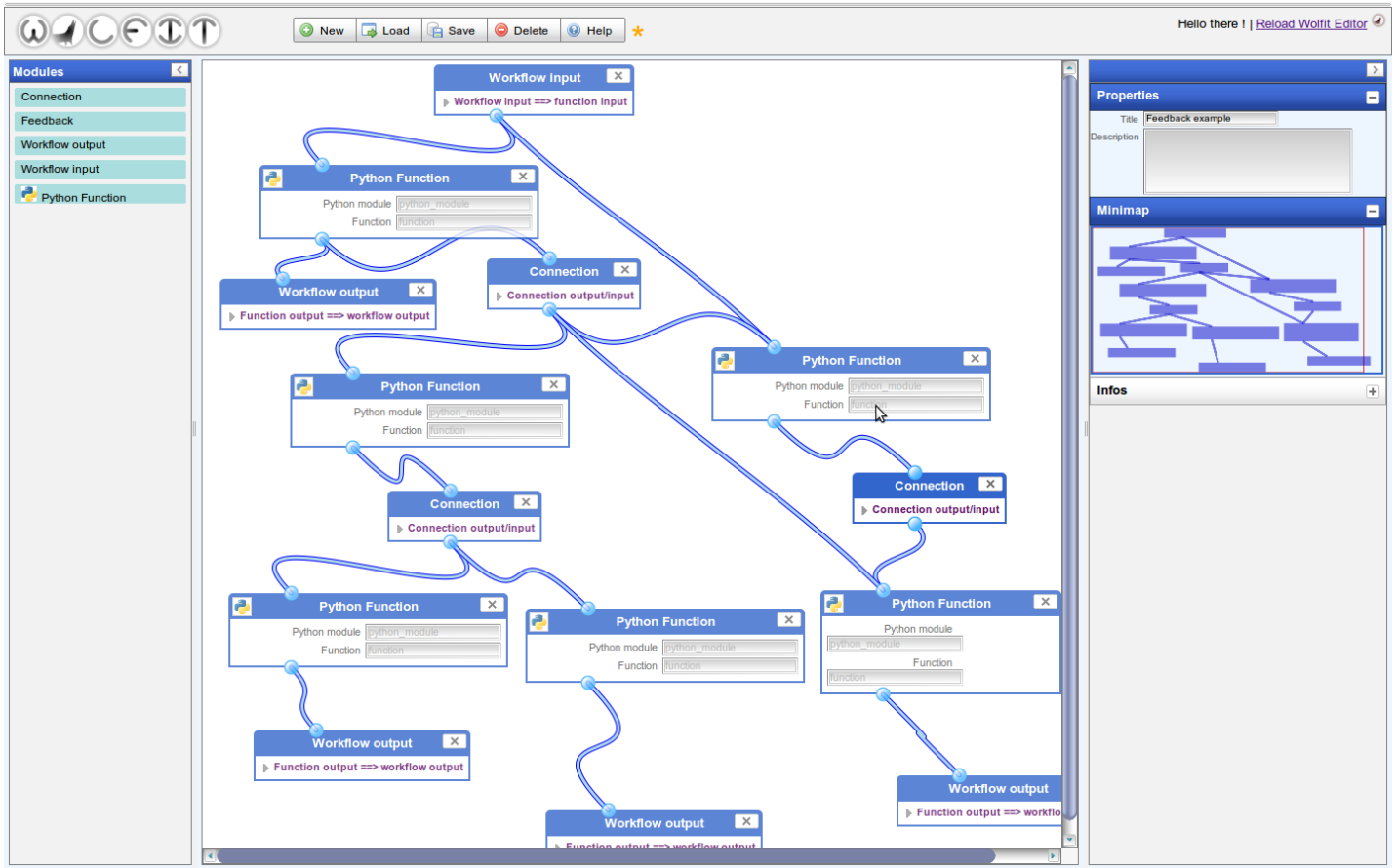
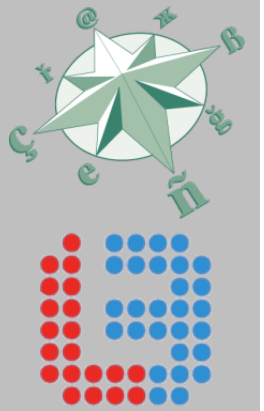
An example of what a more elaborate workflow can look like.





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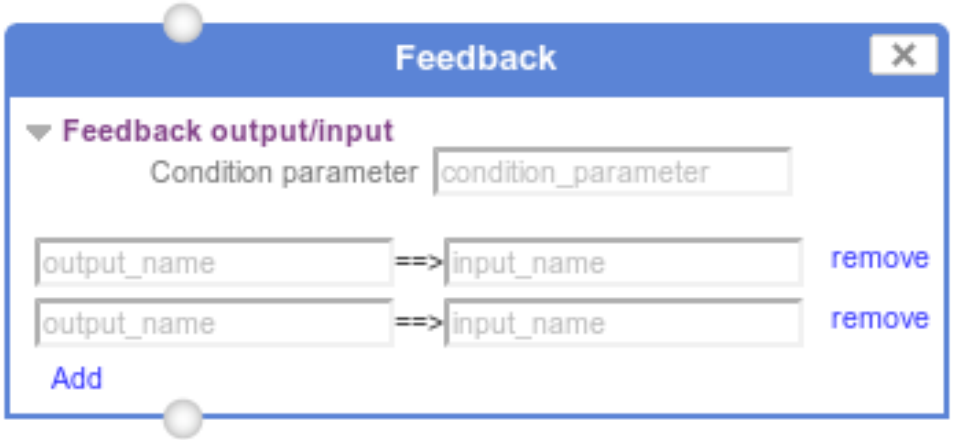
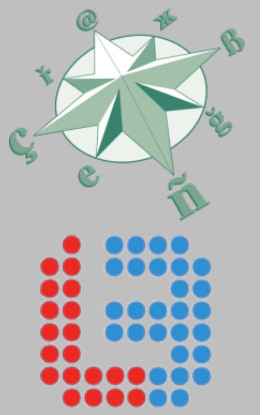
A feedback module





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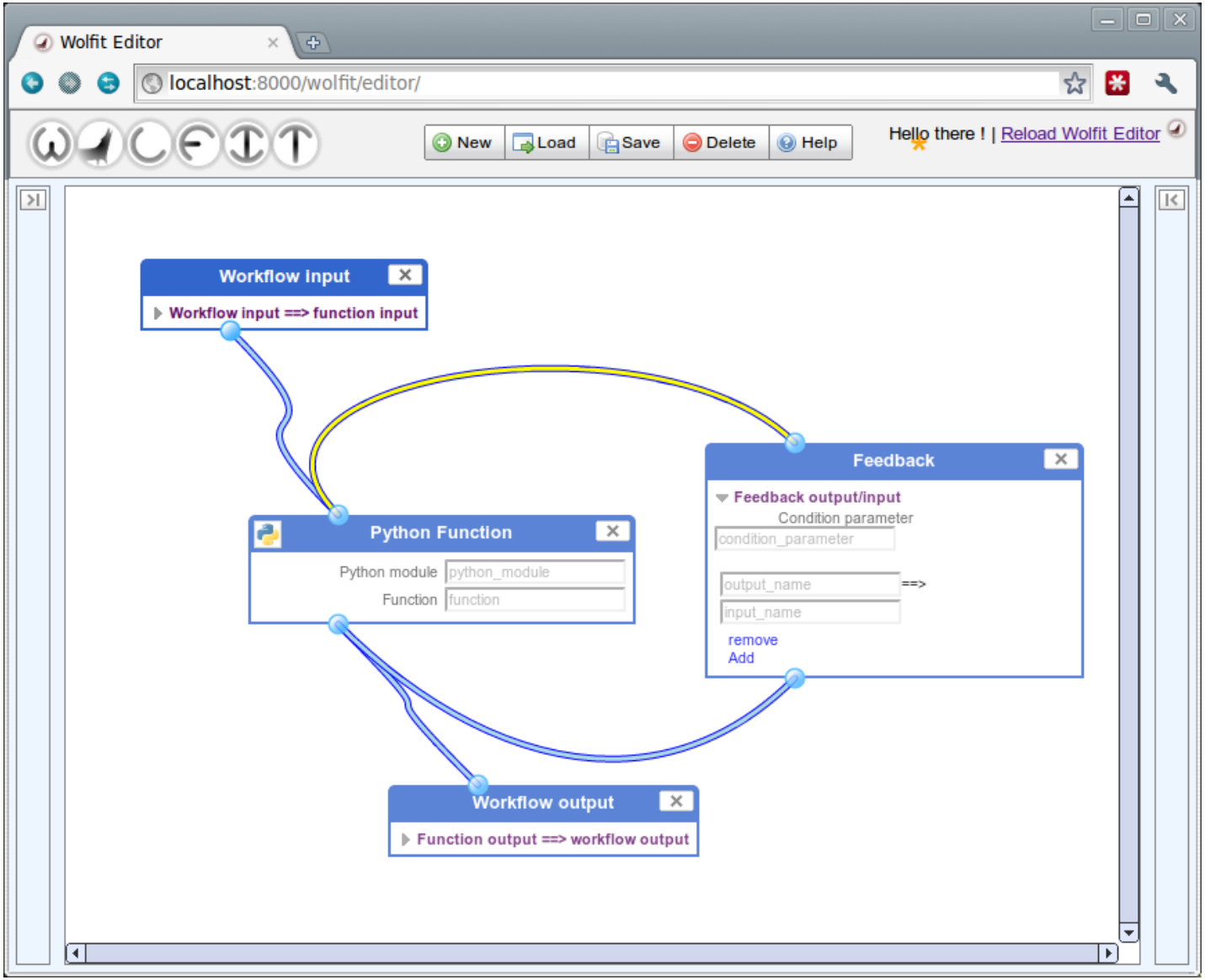
Feedback loops are like while loops. They enable active learning, backtracking, heuristic algorithms, . . .



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Creating and executing a workflow.

By means of a Python script:

- Use the API directly to compose a Process object
- Configure a runner. Currently the ThreadPoolRunner is preferrable.
- Execute the workflow like you would execute a Python function

By means of django-wolfit:

- Create a workflow using the Django web application
- Use an *importer* to create a Process object.
- Configure a runner.
- Execute the Process like a python function.

To do: make creating web demos based on workflows easy

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Overview

Cascaded approach

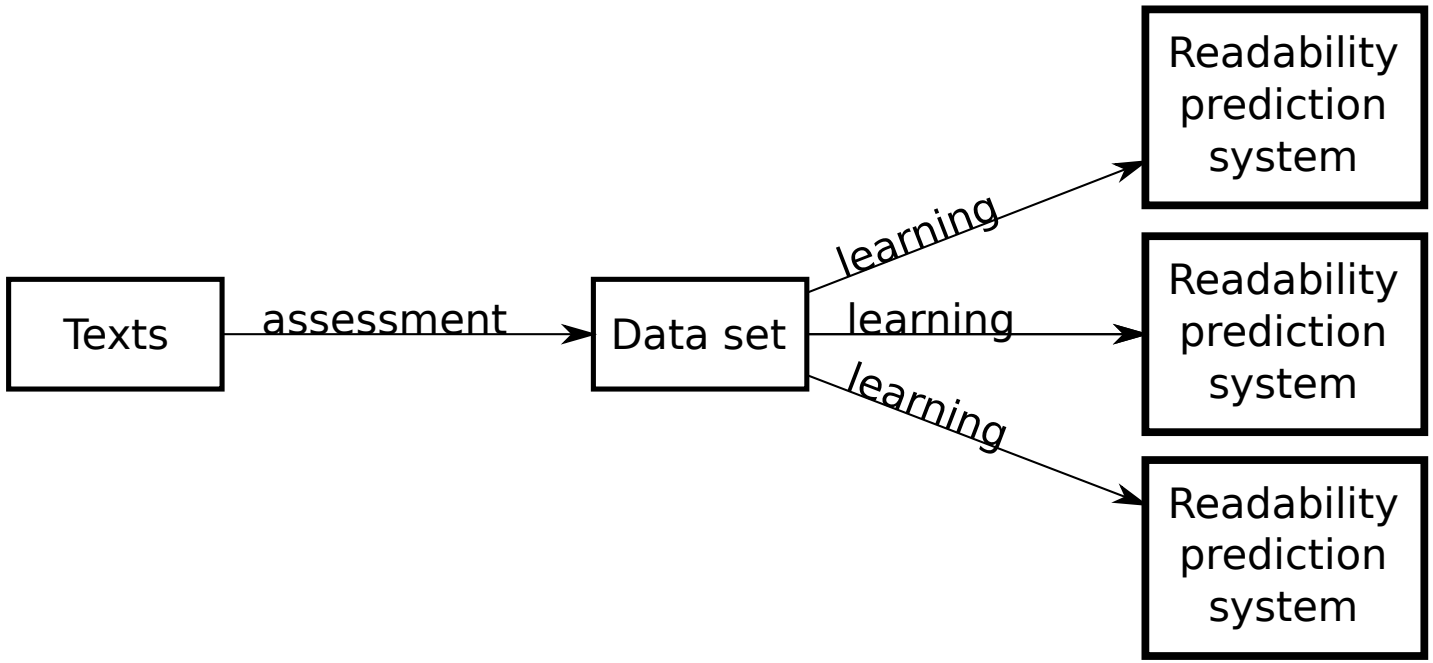
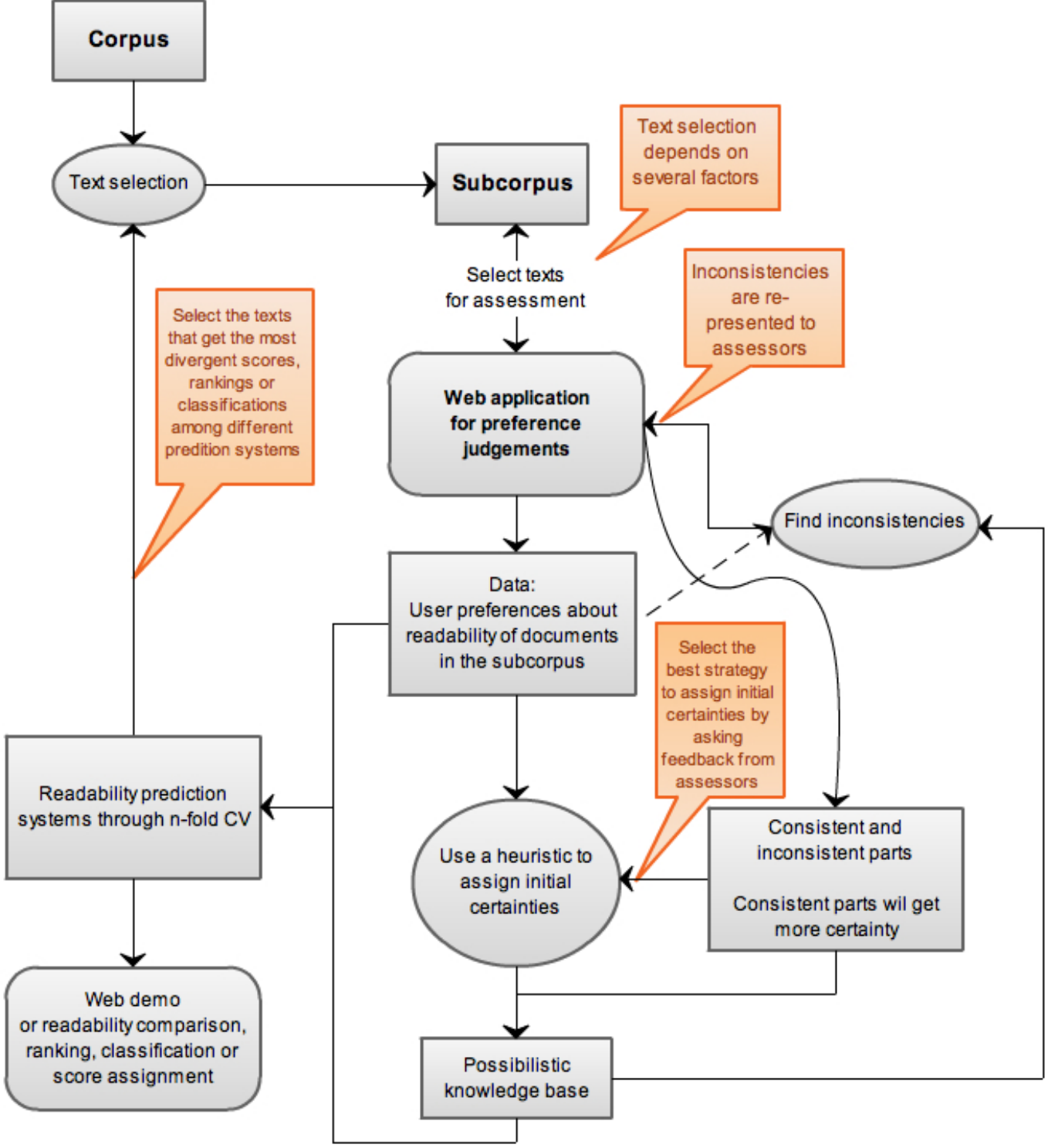


Figure: Readability prediction as a typical cascaded CL task.



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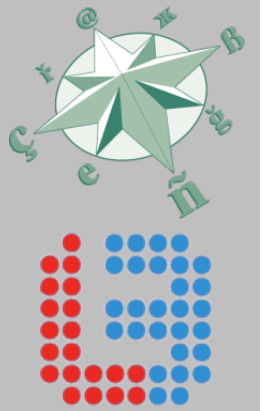
Solutions provided by ALeF

Infrastructure An extensible application was presented and will be implemented. Third party plugins can be added.

Resources Encourage people to make use of ALeF and donate their data sets for research (first try the framework ourselves).



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Thank you!